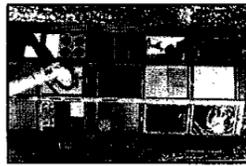


A new system that could keep items from being lost on space station is in the works. Story on Page 3.



The Long Duration Exposure Facility research team at JSC is publishing a book. Story on Page 4.

Space News Roundup

Vol. 29

August 31, 1990

No. 35

Some JSC reservists get active duty

By Kelly Humphries

Five JSC employees were called to military duty this week as a result of President Bush's decision to activate the country's reserves in response to the Persian Gulf crisis.

About a hundred more civil servants are members of the armed forces reserves and subject to being called up if their service branches so desire. So far, JSC reservists have been called up by the Air Force, Army and Coast Guard.

Eight astronauts, including STS-35 Mission Specialist Mike Lounge, are in the reserves but are not expected to be called.

Valerie Burnham, JSC's directives officer, was one of the first to be notified. The Coast Guard called her Saturday morning and told her she had to report to her duty station in Port Arthur by 4 p.m. Monday.

"I'm a little nervous," said the yeoman second class who doubts she will be shipped overseas. "It's a little stressful."

Burnham will switch from her JSC duties, which include coordinating the distribution of JSC Announcements, to working with personnel and service records, and insurance forms that will help keep the port operating.

In the reserves since 1985, she said it is the first time she's been called into active duty. She did serve seven years in the Army before joining the reserves.

"Even though it's stressful, this is one of the things that happens when you're a reservist," she said,

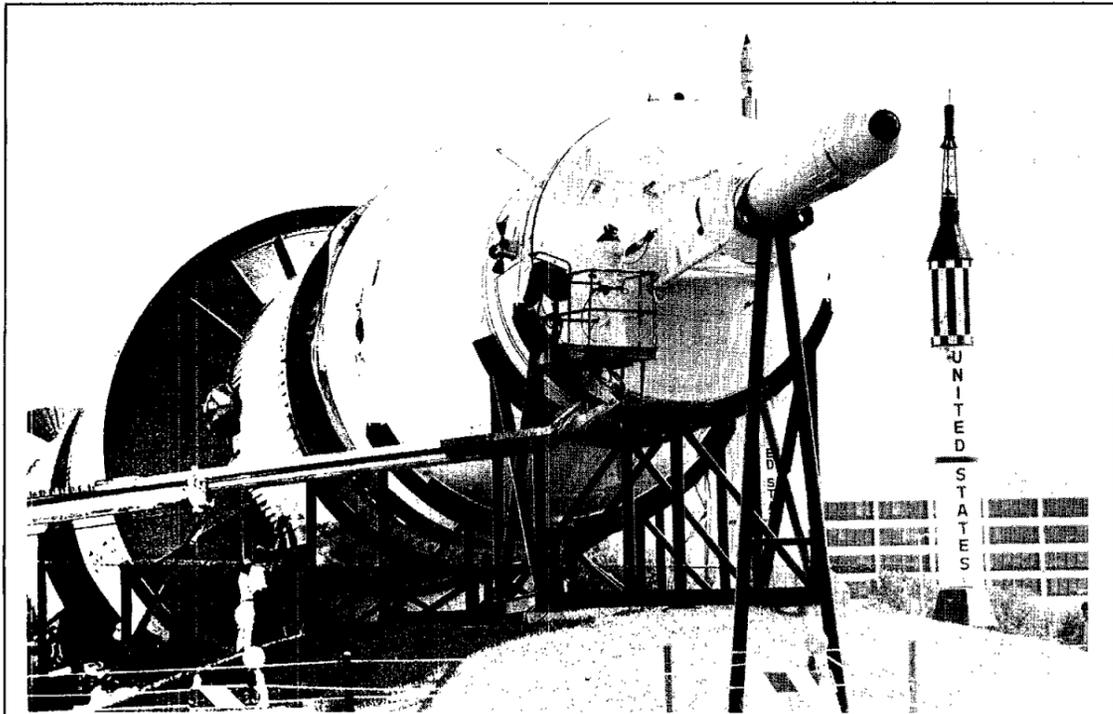
"It's part of the job. Of course, if I were going to Saudi Arabia, I might not be saying this..."

Burnham said the stress comes from being temporarily uprooted, getting her JSC work in order before she left and canceling a planned vacation to South Padre Island for which she was the trip leader. Because she deals with paperwork as a Coast Guard yeoman, she also knows that it will take some time before her military paycheck catches up with her.

Please see RESERVES, Page 4



Valerie Burnham



JSC Photo by Kim Murray

SPACECRAFT SPRUCING—Richard Walker, a painter for Anchor Inc., gives the Saturn V on display at JSC's Rocket Park a fresh coat of paint. He's spraying on a two-part epoxy paint designed to last two to three years. The job, expected to be finished Saturday, is a regular maintenance chore.

Midnight launch to put Columbia, Astro-1 in orbit

By Kyle Herring

The countdown continues for the launch of *Columbia* on its Astro-1 mission just past midnight Saturday with only minor issues remaining.

Workers at the Kennedy Space Center were working a communications dropout problem with the Broad Band X-Ray Telescope payload in *Columbia*'s cargo bay Thursday. Impact on the launch was not immediately known until the cause of the problem could be determined.

The crew—Commander Vance Brand, Pilot Guy Gardner, Mission Specialists Mike Lounge, Jeff Hoffman and Robert Parker, and Payload Specialists Ron Parise and Sam Durrance—arrived at KSC Wednesday night.

"We've been waiting all summer," Brand said. "There's been some musical chairs between the 38 flight and ourselves."

Brand said the crew supports the May decision to stand down from launch due to a liquid hydrogen leak because "you just can't launch unless everything is right."

"We know we're going this time," he added. "The primary attribute of an astronaut is to be patient, so we were."

Shuttle managers met Thursday and today to assess the readiness of the vehicle, launch team and crew to conduct a safe, successful mission.

Al Sofge, NASA test director, said the launch team is ready to again "do what it does best" after a four-month standdown and that he's confident the new umbilical

assemblies are tight.

"We're glad to be back in business," Sofge said. "Our confidence is very high that we're not going to have a leak."

Work on *Columbia* has gone well since the vehicle was moved to launch pad 39A Aug. 9. "Processing has gone very smoothly," said Mike Conley, JSC vehicle manager, prior to leaving for Florida.

"We're looking forward to going to Florida and watching a successful launch. Everything is coming

together," he added.

Launch is scheduled for 12:17 a.m. CDT Saturday during a 2 hour 15 minute window. Tanking of the external tank is scheduled to begin about 4 p.m. Friday.

The forecast is for a 60 percent chance of favorable weather. Scattered and broken clouds are expected at various levels. Winds are forecast to be out of the southwest at 10 knots. The expected temperature is 75 degrees with 7 miles of visibility forecast. There is a 40 percent chance for thunderstorms around launch time.

Work this week included installation of the ordnance devices used to separate the solid rocket boosters from the tank and the orbiter from the tank.

Closeout of the aft compartment was completed and the flight doors were installed. A small object protruding from the side of the tank was noticed and found to be a piece of slag or sludge. The object did not penetrate the foam on the external tank and was removed.



STS-35
Astro-1

Hubble scientists report discoveries

Images show ring around supernova, packed galaxy core

Hubble Space Telescope scientists Wednesday released two new discoveries made through the orbiting observatory—a dramatic new look the great supernova of 1987 and the core of a galaxy 40 million light years away.

The visible-light image of the supernova, one of the most spectacular and unexpected astronomical events of the century, clearly shows an elliptical, luminescent ring of gas about 1.3 light-years across surrounding the still glowing center of the star explosion.

The ring is a relic of the hydrogen-rich stellar envelope that was ejected by a red supergiant in the form of a gentle "stellar wind" 10,000 years before the explosion took place. The diffuse gas was subsequently swept and

compressed into a narrow, high-density shell by a high-speed stellar wind ejected from the star when it evolved back to a blue supergiant stage. The image suggests that the star was more efficient at compressing gas along an equatorial plane, creating a ring-like structure. Because the ring is inclined along the line-of-sight, it appears elliptical.

The observation, made with the European Space Agency's Faint Object Camera on Aug. 23-24, provided unprecedented sharpness and clarity down to .1 arc second. It shows the supernova and its surrounding shell of stellar material whose characteristics previously had been suggested by ground based observations and data from the International Ultra-

violet Explorer satellite.

The new image should provide important insights into the evolution of massive stars and their catastrophic deaths as supernova explosions.

The slowly expanding ring is destined to be relatively short-lived. It will be overtaken by the swiftly moving ejecta from the supernova in a few years. This collision will heat the ring such that it will brightly glow in X-ray and ultraviolet light. Within a few decades, the ring will be completely engulfed by supernova debris which will be visible for centuries as a bright supernova remnant.

In a separate discovery, Hubble provided a remarkably detailed

Please see HUBBLE, Page 4

Astronaut McCulley will leave NASA

By Barbara Schwartz

Astronaut Michael J. McCulley, a Navy captain, is retiring from the Navy and leaving NASA in early October after the STS-41 Ulysses launch.

McCulley has accepted the position of vice president and deputy director, KSC-launch site, with Lockheed Space Operations Co.

"I am not changing teams with this move, only my position on the team," McCulley said. McCulley

will be heavily involved in the day-to-day processing of space shuttles in his new position.

McCulley was the pilot on STS-34 during which the crew successfully deployed the Galileo spacecraft for its journey to explore Jupiter.

Selected by NASA in May 1984, McCulley has served as the Astronaut Office weather coordinator, the flight crew representative to the Shuttle Program Requirements Control Board, technical assistant to the director of Flight

Crew Operations, and currently, as lead of the Astronaut Support Team at Kennedy Space Center.

Regarding McCulley's decision to retire, Director of Flight Crew Operations Donald R. Puddy said, "Mike has always been a top-notch performer in every way. Both as a pilot and as a technical expert, he has made significant contributions to the shuttle program and to my office. We will miss him here at JSC, but his experience and expertise will be extremely valuable in his new position."



Mike McCulley

JSC workers get furlough notices

JSC civil servants received notice this week that they could be subject to up to 22 unpaid, non-working furlough days in fiscal 1991.

In a letter to all NASA employees, NASA Administrator Richard H. Truly emphasized that the 30-day notice means only that there is a possibility of a furlough. He said the agency's analysis shows that the worst case would require a one-

Please see FURLOUGH, Page 4

JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m. to 2 p.m. weekdays.

- General Cinema (valid for one year): \$3.75 each.
- AMC Theater (valid until May 1991): \$3.50 each.
- Sea World (San Antonio, year long): adults, \$17.25, (2-day \$21.95); children (age 3-11) \$14.75, (2-day \$18.95).
- Astroworld (valid 1990 season): adult \$15.97; children \$9.21; season pass, \$39.95; Waterworld, \$8.15; two-day—AW/WW \$18.47.
- Lovin' Feeling Concert (7:30 p.m. Sept. 29, Summit): \$16.
- Country and Western Dance featuring Spur 28 (7 p.m. Sept. 8, Gilruth Recreation Center), includes barbecue dinner buffet \$15.
- State Fair of Texas Trip (7 a.m., Sept. 8—6 p.m., Sept. 30), includes transportation, admission, lodging, buffet breakfast: \$70.
- Astros vs. Braves (7:30 p.m., Sept. 28, Astrodome mezzanine): \$5.

JSC

Gilruth Center News

Sign up policy—All classes and athletic activities are first come, first served. To enroll, you must sign up in person at the Gilruth Recreation Center. Everyone will be required to show a badge or EAA membership card. Payment must be made in full at the time of registration. Classes tend to fill up four weeks in advance.

EAA badges—Dependents and spouses may apply for a photo I.D. 6:30-9:00 p.m. Monday-Friday.

Defensive driving—Course is offered from 8 a.m.-5 p.m., Oct. 13 and Nov. 17; cost is \$15.

Weight safety—Required for use of the Rec Center weight room. The next classes will be Sept. 5 and Sept. 20, from 8-9:30 p.m. Cost is \$4.

Aerobics and exercise—Both classes are ongoing.

Country and western dance—Lessons begin Sept. 10 and will be held every Monday for six weeks; cost is \$20 per couple.

Ballroom dance—Professional instruction in beginning, intermediate, and advanced ballroom dancing. Classes begin Oct. 4 and meet every Thursday for eight weeks. Beginning and advanced classes meet 7-8:15 p.m. Intermediate class meets 8:15-9:30 p.m. Cost is \$60/couple.

Tennis—Beginning tennis lessons, Mondays 5:15-6:45 p.m. six-week course is \$32. Sign-ups begin immediately. Lessons begin Sept. 10. Advanced beginner class will be offered on Wednesdays beginning Sept. 12.

Soccer registration—Will be Sept. 17. Pick up information at the Rec. Center.

JSC

Technical Library News

The following selections are now available in JSC's Technical Library, Bldg. 45, Rm. 100.

The Ada Programming Language [videorecording], R.E. Fairley, 1982, QA 76.73.A35 F34.

Information System Life-Cycle and Documentation Standards, NASA, 1989, QA 76.9.S8 I54 1989.

The Grand Tour: Exploring the Planets [videorecording], McGraw Hill, 1990, QB 501.2 G7.

High Temperature Corrosion of Ceramics, J.R. Blachere, 1989, TA 455.C43 B57.

Robotic Adaptive Grasping Based on Vision and Tactile Sensor Data, Dong Min Woo, 1987, TJ211 .R626 1987.

New Light Alloys: Papers Presented at the 67th Meeting of the Structures and Materials Panel of AGARD, AGARD, 1989, TL 500.N63 A24 No. 444.

JSC

Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2. No phone or fax ads accepted.

Property

Sale: Pasadena, 3-1-5-2, blinds/drapery, 1,072 sq. ft., landscaped, deck/patio, near NASA, \$48,500. 477-2709.

Sale: Resorts Condominium Inc., time share, 20 yrs. remaining on 28 yr. contract, base, Hawaii, \$3,200 cash. 477-2709.

Lease: 2-2.5-2CP, DR, W/D, fan, FPL, 5 min. from JSC, Univ. Trace, patio, 480-0035 or collect (813) 566-3729.

Sale: 2 waterfront lots near NASA, \$38,500/ea. Don, x38039 or 333-1751.

Sale: Shoreacres, contemp., 4,000 sq. ft., 5-4-study plus mother-in-law suite on wooded acre, \$114,900. x38039 or 333-1751.

Rent: Lake Livingston w/frnt frnt house, 3-2, CA/H, furn., decks, pier, ex. cond., wk./wknd. rates. 482-1582.

Lease: Pebblebrook condo, El Lago, 1-1, mirr. walls, blinds/verticals, W/D, upstairs, 650 sq. ft., \$335/mo. Lindemann, 488-3300 or 532-2218.

Sale: CLC/Oakbrook West, 4-2.5-2D, contemp., FPL, no pets, sec. sys., gar. opener, \$995/mo. 482-6609.

Sale: Lot, 120x162 in Friendswood, all util. Rick, 283-1988 or 996-8961.

Lease: Pipers Meadow, 3-2-2, formal, island kitch, FPL, door opener, patio, \$795/mo. plus dep. 486-5527.

Sale: Corner lot on Lake Livingston, Westwood Shores, 60x115, util., avail., \$9,500, OBO. x30032 or x31834.

Rent: Room, priv. bath, kitch. priv., Nassau Bay, non-smoker. x38677 or 333-2950.

Sale: Univ. Green, 2-1-2 patio home, fenced, new paint, blinds, drapes, fans, FPL, deck, \$76K. 480-7338.

Sale/Lease: 3-2-2 in Friendswood, Wedgewood Vill., 1,600 sq. ft., formal DR, new paint/carpet, \$68,900 or \$700/mo. Gretchen, 282-6650 or 482-6744.

Sale: 2-2.5-1 plus 1 townhome, \$6K assumes FHA fixed rate, no app., \$680/mo. plus \$50/mo. maint. fee, ex. cond. x35250 or 333-2636.

Sale: Meadowbend, 3-2-2, blinds, fans, microwave, gar. door opener, under 10 yr. warr., 8.5% FHA assum. 538-1071.

Sale: Warehouse, 13K sq. ft. on 1.1 acres, Bayview, \$85K. 776-2375 or 339-1957.

Lease: Webs/Ellington, 2-1 apt., \$425/mo. Dave, x38156 or 486-5181 or Herb, x38161.

Sale: Cornet lot, Friendswood, Wilderness Trails Subdiv. 996-9157.

Sale: Dickinson, brick 4-2-2D, 2,800 sq. ft., open concept, FPL, trees. x31466 or 534-3932.

Rent: Galv. condo, Seawall & 61st, sleeps 6, dly./wkly./wknd. rates, cable, pool. x33479 or 486-0788.

Sale: Surfside, 2-1-1, 2 bks from beach, corner lot, needs work. \$28K. 480-5141.

Sale: 60 acres on Hwy. 80, 3 mi. from Karnes City, TX, 50 mi. from San Antonio, 2-story house in El Campo on 1.5 lots w/fruit trees. 783-9164.

Rent: Room in lg. house, \$270/mo., incl. util. Eric, x38420 or 484-9179.

Cars & Trucks

'88 Acura Integra LS, 27K mi., AC, PW, PL, AM/FM/cass., gray, ex. cond., \$10.5K. 996-8410.

'83 Ford van, 134K mi., only 26K mi. on V8 & AC, captr. chairs, table, dual tanks, \$4,500. Samouce, x35053 or 482-0702.

'76 Mercedes 300D, all pwr. w/sunroof, good cond., \$3,200, OBO. Jerry, x39287 or 554-6093.

'85 Malibu Skier, Ind. trlr., Barefoot equip., access., 350 Chevy, ex. cond. Lon, 998-7146.

'85 Toyota Supra, sunroof, auto., 66K mi., loaded, ex. cond., \$6,995. 283-5356 or 661-6371.

'80 Chev. Citation, 4-dr. hchbck., AC, runs well, int. needs work. \$550. 482-5621.

'83 Chev. Bonaventure, 8 pass. wndw. van, V8, dual air, good cond., \$3,400 cash. Bob, x36527 or 482-6730.

'88 Pontiac LeMans, 2-dr. hchbck., 5-spd., 41K mi., ex. cond., \$4,200. x39926 or 280-9408.

'84 RX-7, ex. cond., 94K interstate mi., \$4,300. Rick, 283-1988 or 996-8961.

'83 Honda Prelude, 5-spd., sunroof, ex. cond., 83K mi., \$4,500. B. Craig, x32338 or 1-420-2936.

'83 Buick LeSabre, 2-dr., loaded, ex. cond., \$3,500. Scott, x39156 or 482-8017.

'69 Lotus Europa-Mid eng. fiberglass British sports car, 56K mi., ex. cond., \$6K. Lou, x35242 or 326-2930.

'65 Olds Starfire sport coupe, 106K mi., orig. owner, \$2K, OBO. Tom, x38298 or 488-4089.

'87 Chev. Cavalier, 4-dr., auto., 45K mi., ex. cond., \$4,100, OBO. x39579 or 482-6187.

'86 17' Starcraft pop-up camper, AC, stove refrig., sleeps 6, ex. cond., \$2,995. Gwyn, 944-8775.

'78 Lincoln Towncar, orig. owner, new motor, \$1,500. Gail, x30445.

'87 Pontiac TA, loaded, T-tops, sec. sys., ext. warr., 37K mi., \$9,200. Brian, 532-3507.

'82 Z28, auto., T-tops, new AC/tires, 81K mi., \$3,800, OBO. Mike, x39856 or 484-7319.

'77 MG Midget, new top/tires/paint, needs work, \$1,750, OBO; elec. truck, stake bed, Westinghouse, \$450. Brian, x37332 or 543-2358.

'89 Chev. Cavalier, \$8,200. 282-4587 or 538-1479.

'80 Concord stationwagon, \$1,200 nego. 748-2119.

'87 Volvo 245 GL, ex. cond., loaded, \$12,300, OBO. Scott, 283-5611 or 482-1809.

'88 Olds Cutlass Ciera XC, 2-dr., 34K mi., ex. cond., \$7,800. 334-2647.

'78 Buick Regal, good tires/int./body, reb. trans., needs valve job, \$550, OBO. Greg, 554-2504.

'89 Ford Probe LX, 16,400K mi., sunroof, ex. cond., \$10,900. 335-1711.

'88 Ford Mustang conv. LX, auto., ex. cond., \$10,500. Chad, x35786 or 334-1852.

'85 Toyota Corolla LE, 4-dr., auto., ex. cond., \$4,750. 558-7442.

'86 Olds Cutlass Supreme Brougham, V6, good cond., loaded, \$6K, OBO. 484-9583.

Boats & Planes

'59 15' Duracraft, galv. trlr., 40hp Johnson, \$500. Sean, 480-8190 or 996-7693.

'85 Wellcraft 180 Elite, 170 I/O Merc., ex. cond., Sportsman trlr., \$9K, OBO. 332-3730.

25 1/2' Robald center console boat, twin Yamaha 150hp OB motors, \$14K. 482-3727.

'87 Wellcraft, 170 classic, 115 Merc. OB. 487-3593.

Stalom Ski 67' Ebonite Shuttle, ultra pro ski rope, anchor line, oar, etc., \$75, OBO. camper/boat hitch; draw-lite 3500 lb. cap. hitch w/remov. recep., 2" chrome

Today

Cafeteria menu—Special: fried chicken. Entrees: fried shrimp, baked fish, beef stroganoff. Soup: seafood gumbo. Vegetables: okra and tomatoes, buttered broccoli, carrots in cream sauce.

Monday

Cafeteria menu—Special: meat sauce and spaghetti. Entrees: franks and sauerkraut, sweat and sour pork chop with fried rice, potato baked chicken. Soup: cream of potato. Vegetables: French beans, buttered squash, lima beans.

Tuesday

Library workshop—The JSC Technical Library will offer a Keywording and Information Retrieval Workshop from 12:30-4:30 p.m. Sept. 4 in Bldg. 45, Rm. 304. To register, call Sheryl Gates at x33074; for details, call Donna McAllister at x36144.

Cafeteria menu—Special: smothered steak with dressing. Entrees: beef stew, liver and onions, shrimp Creole. Soup: navy bean. Vegetables: buttered corn, rice, cabbage, peas.

Wednesday

Library workshop—The JSC Technical Library will offer a Scientific and Technical Information Resources Workshop from 1-4 p.m. Sept. 5 in Bldg. 45, Rm. 304. To register, call Sheryl Gates at x33074; for details, call Donna McAllister at x36144.

AIAA/NASA conference—The American Institute of Aeronautics and Astronautics and NASA will sponsor a conference of Innovative Technologies for the Exploration of Space Sept. 5-6, at the Ramada Renaissance Techworld in Washington, D.C. For more information, call Leslie Tavenner at (202) 646-7453.

Cafeteria menu—Special: salmon croquette. Entrees: roast beef, baked perch, chicken pan pie. Soup: seafood gumbo. Vegetables: mustard greens, Italian green beans, sliced beans.

Thursday

Blood drive—JSC's third Onsite

Blood Drive of 1990 will be from 8-11:30 a.m. and 1-3:30 p.m. Sept. 6 at the Gilruth Recreation Center. For appointment call Bob Jones, x33004, Mary O'Rear, x36531, or Helon Crawford, x34159. For additional information call Crawford.

Cafeteria menu—Special: stuffed cabbage. Entrees: beef tacos, ham and lima beans. Soup: beef and barley. Vegetables: ranch beans, Brussels sprouts, cream style corn.

Sept. 7

Cafeteria menu—Special: Salisbury steak. Entrees: fried shrimp, deviled crabs, ham steak. Soup: seafood gumbo. Vegetables: buttered carrots, green beans, June peas.

Sept. 12

Integration expo—The Information Systems Directorate is sponsoring a Macintosh-DOS Integration Expo from 9 a.m.-4 p.m. Sept. 12-13 in Bldg. 12, Rm. 112. For more information call Pat Doerr, x37589

Sept. 13

JSC/NPMA meeting—The JSC National Property Management Association (NPMA) monthly dinner meeting will be at 6 p.m. Sept. 13 at the Rec Center. Linda Massey of NASA's Supply and Materials Management Branch will speak. For more information contact Sandra Pierce at 282-4151.

Sept. 25

BAPCO meeting—The Bay Area PC Organization (BAPCO) will meet at 7:30 p.m. Sept. 25 at the League City Bank and Trust. For more information call Earl Rubenstein, x34807, or Tom Kelly, 996-5019.

Oct. 20

Wings Over Houston—The 1990 Wings Over Houston Airshow will be Oct. 20-21 at Ellington Field. The U.S. Marine Corps' vertical take off and landing jet, the Harrier, will participate. The Confederate Air Force also will celebrate the 50th Anniversary of the Battle of Britain with its WWII

airpower demonstration. Contact Col. Ray Jones, 850-7545, or Lu Lewis, 784-5200, for more information.

Oct. 28

Bicycle ride—The Texas Coastal Century bicycle ride, a comprehensive tour of the greater Bay Area, will be from 8 a.m.-5 p.m. Oct. 28, starting at the University of Houston-Clear Lake. Proceeds will benefit the Houston Food Bank and University of Houston-Clear Lake recreation and sports. Early registration by Oct. 1 is \$10; registration after Oct. 1 is \$15. For applications and more information, visit the Rec Center. Call Mike Prendergast at 335-2505 for details.

Oct. 30

Space conference—The fourth annual "Space: Technology, Commerce and Communications" Southwest conference will be held Oct. 30-Nov. 1 at the Nassau Bay Hilton. The aerospace and space commerce conference is sponsored by the Space Foundation. For more information, call John McLeaish, 480-7445.

Space conference—Space Exploration '90, a conference and aerospace industry exposition sponsored by the NASA Alumni League, will be held Oct. 30-Nov. 1 at the South Shore Harbour Resort and Conference Center. Contact Carol Ramey, exposition manager, 800-765-7615, for more information.

Nov. 6

Ada users' symposium—The third annual NASA Ada Users' Symposium will be Nov. 6 and is hosted by JSC and the MITRE Corp. For more information contact John Cobarruvias, x39357, or Sheila, 333-0910.

Nov. 27

National technology conference—Technology 2000, a national technology conference, will convene Nov. 27-28 at the Washington Hilton Hotel. For more information call 212-490-3999.

Miscellaneous

Smith & Wesson, Mod. 12 Airweight, nickel, \$275; Star 45, auto., new, \$275. 332-5057.

Carpet, rose pattern, 9x12, \$125; Ward's Signature chest freezer, \$200. Samouce, x35053 or 482-0702.

Oriental rug, 6x9, Ming design, navy/ivory/maroon, \$250, OBO. Roger, 335-2780 or 280-0769.

Rollaway bed, 3/4 sz., \$50. x36080 or 482-5621.

Jobst extremity pump w/gauntlet, ex. cond., \$100. Earl, x34807 or 326-2354.

Sunbeam mini food proc., new, \$12. 486-8716.

Cristal pic. frame, new, holds 4x6 pic., \$10. 486-8716.

White velvet/face wedding gown, sz. 10/11; maid of honor & flower girl dresses, BO. 480-3952.

Refrig. 4.2 cu. ft., \$150. Ken, 335-4312 or 474-3500.

Stainless steel port, Johnson or Evin. spline shaft, 12 3/4 x 21, ex. cond., \$185. x38430 or 335-1568.

25hp Suzuki OB motor, hand stern from motor, long shaft, 11K, OBO. x31786 or 438-1347.

Sears 16 function port. eng. analyzer, \$50. Ed, x37696; 1/1/2hp Johnson OBM, wlr. cooled, 2-6 gal. tanks, \$100; Tornado elec. concrete hammer, \$60; Sears 36" lawn sweeper w/tow bar, \$20. Ed, x37666.

Sears comput. treadmill, good cond., \$100. Ed, 471-2542.

Tappan 1.2 cu. ft. microwave, ex. cond., \$100; 20 gal. aquar. w/pump, \$25. 480-3424.

Sears apt. sz. washer, \$195, OBO; 10-spd. bike, good cond., \$55, OBO; wgt./bench press w/leg workout attach. incl. wghts., \$65, OBO. x38385.

Comput. desk, ash wood, \$85; Sears upright vac., \$35; Mod. style nightstand, \$30; '50's rocking chair, \$15; dog house, \$30. 538-1071.

2 sleeping bags w/air matt., \$25/ea. x30411 or 480-2646.

Dunlop Volley II tennis racket, \$20; 2 racketball rackets, \$10/ea.; Adidas softball shoes, sz. 11, \$10. x30411 or 480-2646.

Lennox china, ex. cond., Montclair 8 place setting, plus serv. pcs., ivory w/silver band, \$395; antique Blue Willow china. Claire, 488-5307.

Engagement ring, 18K yellow gold, round diamond solitaire, .68 carats w/6 round diamonds, .18 carats, \$1,200. x30874 or 333-1316.

2-dr. legal sz. file cab., ex. cond., \$100. x30874 or 333-1316.

Surfboard, 6'1" Maxwell, good cond., \$125. Billy, x31339 or 534-4780.

Wood desk, 7 drwrs., ex. cond., \$80; desk chair, \$20. Gail, x39838.

Hospital bed, elec. head/knee positioning, remov. side rails, ex. cond., Diane, 471-5291.

Pumpmaster 760 pellet-n-BB gun, ex. cond., \$30; bow/arrow set, 15 lb. pull w/5 bear arrows, \$20. Aaron, 944-0493.

Goodyear tires, used, 2, Eagle, VR50 2250VR16, \$25. Gary, x32454.

Circular saw cutting table w/adaptor jig, Gary, x32454.

RCA ster. TV, warr., \$400, OBO; Sears exer./rower, new, \$125; steel stor. cab., \$75, OBO; end & cocktail tables, \$50; B&W TV, \$30; 8mm mov. cam. & proj., \$50; glass front ster. cab., \$45; sofa sz. pic., red poppies, \$65; Seal-a-Meal, lg. sz., \$15; Seal-a-Meal, sm. sz., \$10; aquar. stand, \$10; Sanders mens western boots, sz. 10, \$65; old cast iron grill w/stand, \$75; 4-spd. trans. for Dodge, \$45; Com-a-Long, \$25. Diane, 283-5618.

ball, ex. cond., will fit most mid-size-full sz. cars/trucks, \$10

Inventory Tracking

Tiny electronic 'tags' may help space station astronauts keep track

By Pam Alloway

During the STS-31 mission in April, an amused Commander Loren Shriver relayed to ground controllers that STS-33 astronaut Sonny Carter's missing watch had been found aboard the Space Shuttle *Discovery*.

Had a tracking system proposed for Space Station *Freedom* been installed, Carter's STS-33 crew mates could have sent out an electronic signal and located the elusive timepiece.

Misplacing objects, large or small, can be frustrating on Earth but, on space station, misplacing or miscalculating the number of certain items could be hazardous.

To address this problem, the Man-Systems Division has been working on new technology to track items within the space station. Such a tracking system would be the space program's first automated system for in-flight inventory control.

"For me, the space station will be the most complex environment that we've ever had to deal with," said Leong "Jack" Lew, subsystem manager for Space Station Stowage and Inventory Management Systems. Lew, an engineer, has worked for either NASA or NASA contractors since 1963.

"During Skylab, people on the ground in flight control would sit in a back room with pencils and pads to track items," Lew said. "On shuttle, I figured there are about 5,000 loose items such as photographic equipment and supplies, food, tools, hygiene supplies, payload parts and spares. On space station, we'll be dealing with in excess of 50,000 items."

"With shuttle, if something is missing or misplaced, once it comes down everything is cleaned out and

it's eventually found," he said. "But space station is designed to be in orbit for 30 years. We won't be able to bring it to the ground and clean house."

In today's market there are six different inventory tracking technologies: bar coding, voice control/recognition systems, optical character readers, radio frequency/electronic tags, magnetic strips, and the vision systems.

The prime contractor for the space station's proposed inventory tracking hardware is Boeing Aerospace in Huntsville, Ala., one of the Work Package 1 contractors. JSC is providing the subsystem management for the project's development, Lew said, and is waiting for additional research and development funding to build flight ready hardware for detailed testing.

Boeing is working on a bar coding system but Lew said he believes more than one type of tracking technology will be necessary.

"To locate something labeled with bar codes, huge scanners would be required to scan the entire module," Lew said. "That's not a feasible solution. Bar code labels have to be manually scanned. If you don't know where it is, how can you scan it? For example what about if you couldn't find a critical item like a crew member's eyeglasses?"

"Bar codes also are affected by such things as ice and other contaminants," Lew said. "For future space travel we have to have something better than the bar code. Something that can read faster, locate missing things and reduce crew interaction time."

Therefore, Lew has concentrated his work on potential alternatives such as miniature, multi-read, electronic, passive tags. Single-read tags

on the market now can only be read one at a time. NASA contracted with Lockheed Air Terminal Co. in Burbank, Calif., to develop a tag system that can read at least 5,000 tags per second with an ultimate goal of 15,000 tags per second. Under a previous NASA contract, Direct Current-Light Inc. of Lawndale, Calif., developed an electronic reader for the proposed space station system.

Scientists at the Oak Ridge National Laboratory in Oak Ridge, Tenn., are working on related technology in their development of a solar-powered infrared micro-miniature transmitter. However, the Oak Ridge transmitter is a single read device. The Oak Ridge transmitter initially is being developed to aid scientists in tracking and studying Africanized, or "killer" bees.

The system that's been worked on at JSC uses a hand-held detector and electronic tags. They are commonly referred to as "RF tags" which stands for radio frequency electronic tags. The RF tag, when installed on an object, can receive and return a signal at regular intervals enabling whoever activated the system to locate an item.

"Ideally we want the scanner to be able to read a large number of tags in a room and do it quickly," Lew said.

The design requirements state that the tags must not be affected by expected space station environmental conditions. They must be as small as possible and capable of being read from a distance of 40 feet. The tag is about one-fourth the size of a postage stamp and if a battery were added to the tag, its range would be improved, Lew said.

Electronic tags cannot read through aluminum or any kind of metallic material, Lew said, and the

electronic tags do not use batteries as their power source. The reader device, which does have a battery, emits a signal of seven watts maximum to the tag. The tag has a built-in antenna in the form of a microchip circuit. The antenna picks up the signal, converts it to power, activates the integrated circuit and sends a response to the reader identifying its location.

"The difference with the Lockheed Air Terminal tag system is that it is based on a roll call system where the tags respond only when asked and respond very fast one at a time," Lew said. "Other systems involve all the tags responding at once. The Lockheed system is faster and more accurate."

An additional feature of the proposed inventory system is its selective signal capability which would enable a crew member to look for a missing item. A crew member would need only to enter the code of the missing item into the reader.

The project will require designing multiple readers, Lew said. Most likely there would be a fixed reader and multiple portable readers on space station. The portable readers would be the size of small walkie-talkies and would include a small computer to collect and store data. It could be plugged into the fixed reader and tied into the inventory management system, enabling the reader to dump its collected information.

Lew is convinced this electronic tracking inventory system would be an important part of space station.

"In the event of an emergency there are certain critical items you've got to have that you may have to locate fast," Lew said. "We must have better control. Space will be limited and the

cost of shipping items up to space station will run something like \$5,000 a pound added to the time of an astronaut on orbit which would total about \$20,000-\$25,000 an hour. That's some pretty expensive time you're wasting hunting for an object, causing the crew to do chores just to find something or to figure out what's left."

One application would be keeping an inventory of crew food supplies. The reader could be placed in the trash bin and, with little crew interaction, could give a complete, accurate accounting of the food that had been consumed, and hence what was left in storage.

Another on-orbit application would be in the Health Maintenance Facility area, Lew said. The crew could use medical supplies, throw the packaging away and have a portable reader in the trash area to monitor the number of supplies used.

The tags also could be used outside the space station or the shuttle, Lew said.

As an added incentive in the development of this system Lew said there are spinoff uses that would be beneficial to those who remain on the Earth. KSC could use tagging to track ground support crew members reacting to an emergency on the launch pad, Lew said. Currently the workers wear jumpsuits with numbers on their backs and arms to assist spotters in tracking them but water spray could obscure their numbers.

Lew said the tagging system offers unlimited commercial spinoffs such as: the tagging of individuals' vehicles which would be particularly useful in the case of a theft; tagging airport baggage to deter unlawful activities; and general inventory control.



JSC Photo by Kim Murray

Top: Tracking "tags" as small as the one on this Africanized or "killer" bee could be invaluable in keeping inventory and preventing the loss of small items on Space Station *Freedom*. Left: JSC engineer Leong "Jack" Lew shows off a proposed tag on a space station food container. Above: Items that need to be located in a hurry, such as an astronaut's eyeglasses, could be tagged for tracking.

Magellan's troubles delay radar mapping start

By Pam Alloway

NASA engineers have delayed the start up of Magellan's radar-mapping mission of the Venusian surface until the last week of September while they investigate the probe's communications trouble.

Although Magellan scientists and engineers believe they understand what caused the first loss of signal, they are still trying to understand the second incident and said there could be more communication problems with the \$550 million probe.

"I think it could happen again, that's

why we're planning contingencies," said Anthony Spear, Magellan project manager at NASA's Jet Propulsion Laboratory in Pasadena, Calif., during a recent press conference. "We have to believe it will happen again until we understand the problem."

Scientists will test Magellan's radar-mapping capabilities again on Sept. 15. Thursday, Magellan was in its 140th orbit of Venus and was about 150 million miles from Earth.

Magellan braked into orbit around Venus Aug. 10 after a 15-month journey. Two weeks ago during the

spacecraft's checkout, its radar instruments took the most detailed photographs ever of the planet's rough surface. It will take Magellan about eight months to map nearly all of Venus' surface with cloud-piercing radar.

Magellan was scheduled to begin its mapping mission Saturday but signal losses have complicated the scheduled events. The spacecraft's communication capabilities have failed twice. Last week it lost radio contact with ground controllers for 17 hours and for 15 hours the previous

week.

Scientists believe the earlier blackouts were triggered in part by computers on the spacecraft that they said have "run amok."

They believe the first incident occurred when there was an unknown loss of signal, known as a heartbeat, between the spacecraft's main computer and an attitude control computer that caused the spacecraft to swing into a safing routine, Wall said. During the routine, the probe attempted to find the Sun and a guiding star that would have enabled it to locate the Earth for

further instructions. It apparently locked onto the wrong object and thought it was pointed toward Earth so it waited 16 hours for Earth to respond.

After 16 hours of waiting, another unknown event triggered a second safing operation which prompted the spacecraft again to sweep the area in its search for Earth. It finally located Earth and engineers maintained it in the safing mode until the second incident three days later.

Wall said scientists and engineers still are trying to understand what caused the second loss of signal.

Mission Control viewing hours not for babies

The Mission Control Center viewing room will be open to JSC and contractor badged employees and their families during portions of the STS-35 mission.

One change has been made to the guidelines. Children under the age of 5 will not be permitted in the viewing area.

Based on a Saturday morning launch, employees will be allowed to visit the MCC from 2 to 5 p.m. Sunday and Monday, from 2 to 4 p.m. Tuesday through Friday, and 2 to 5 p.m. Sept. 9 and 10.

Employees must wear their badges and escort family members through the regular public entrance on the northeast side of Bldg. 30. Visitors should limit their stay during busy periods.

Since many variables are involved in mission operations, viewing times and dates may change with little notice. Employees are encouraged to call the Employee Information Service at x36765 for the latest information.

Cafeteria hours set

Special cafeteria hours have been established for the STS-35 mission.

Based on a Saturday launch, Bldg. 3 will be open from 11 a.m.-4:30 p.m. Saturday, 7 a.m.-4:30 p.m. weekdays and 7 a.m.-4:30 p.m. weekends and holidays except for launch day.

Bldg. 11 will be closed launch day, weekends and holidays, but will be open from 6:30 a.m.-2 p.m. weekdays.

STS-41 launch passes won't be available

NASA has canceled all formal guest operations for the STS-41 mission because of the threat of budget constraints due to the Gramm-Rudman-Hollings law.

The move means that invitations will not be extended to people nominated by field centers and Headquarters offices, and that vehicle passes normally issued to JSC employees on a first-come first-served basis will not be available.

The STS-41 launch window opens Oct. 5 during the two-week initial sequestration period that will go into effect if Congress fails to meet certain deficit-reduction targets by Oct. 1.

Supply allocations are being rescinded

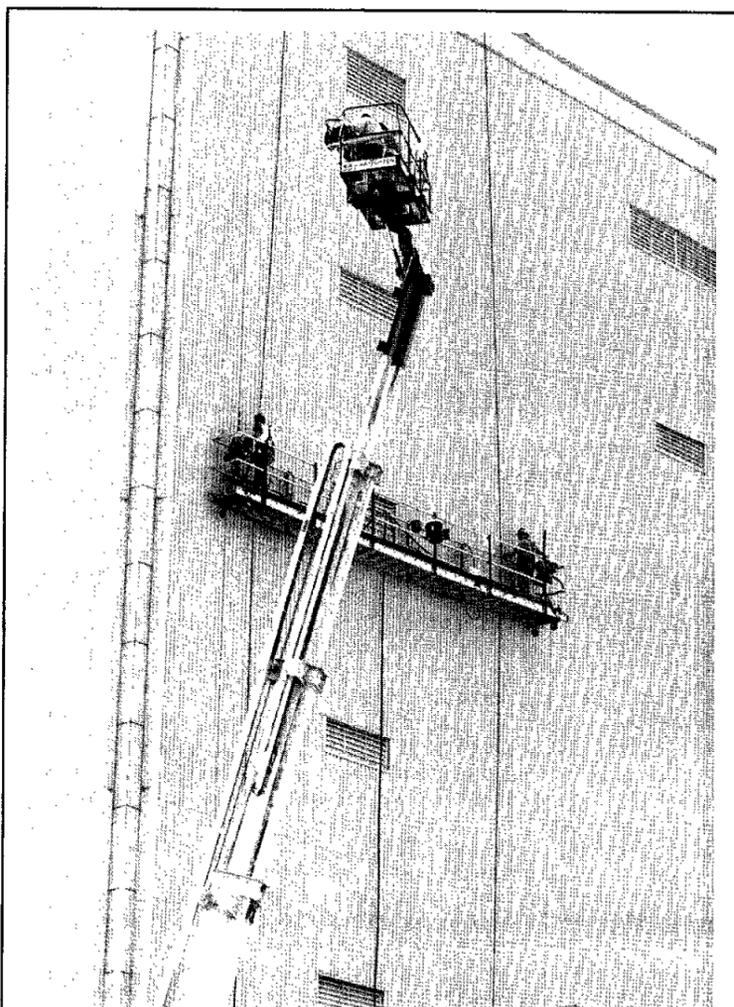
Administrative supply allocations will be rescinded today because of severe restrictions on research and program management funds this fiscal year and budget uncertainties for fiscal 1991.

Grady McCright, deputy director of Center Operations, said Thursday that all purchase requests using the R&PM fund code 073-36-FB will be returned to the originator without action.

Copy and computer paper will continue to be issued, but other office and paper supplies will not.

Orders placed before the close of business today will be filled if the supplies are in the warehouse.

Any exception to the restrictions will require the approval of the user organization's director and the concurrence of the Center Operations director. For more information, call John Rosales at x34840, or Linda Massey at x36656.



JSC Photo by Jack Jacob

IRON MEN—Iron workers for Pan Am World Services tackle a big job on JSC's Bldg. 32, the Space Environment Simulation Laboratory with a scaffold and "cherry picker." Foreman Bill Archer and co-workers Marc Anderson, Phil Lyons, Hal Moen and Eddie Scoggins are replacing all of the screws and the caulking on the metal sided building that houses the large vacuum chambers used to simulate the space environment for spacecraft component tests.

Publication describes LDEF exposure effects

The first of several publications describing the effects of almost six years in space on the Long Duration Exposure Facility should be out in September.

LDEF scientists are still in the formative stages of their research, but are preparing to share their preliminary results at the First LDEF Symposium Oct. 22-26 in Williamsburg, Va.

Bill Kinard, chief scientist and head of the LDEF Data Analysis Office at Langley Research Center, said "things are going great" and all of the experiments are producing useful information.

"The more we look at it the more we see we can learn from the analysis of the data," Kinard added. "It's truly remarkable that the systems and hardware functioned as well as they did."

The JSC book, "Meteoroid and Debris Impact Features Documented on the Long Duration Exposure

Facility: A Preliminary Report," describes the impact features made by meteoroids and man-made orbital debris, said Mike Zolensky, a member of the Meteoroid and Debris Special Investigation Group and curator of LDEF surfaces for JSC.

The book includes detailed descriptions of all of the approximately 5,000 largest impact features on LDEF and a listing of all the LDEF surfaces curated at JSC. It concludes with a list of recommendations regarding the importance of LDEF meteorite and debris studies to agency programs such as the space station.

Kinard said additional databases will be published by each of the other special investigation groups dealing with systems, materials and radiation.

Once published, copies of the meteoroid and debris book will be available by contacting Zolensky, Mail Code SN21, or the JSC Technical Library.

Course to teach technical team building

A course designed to teach the art of building high-performance technical teams will be offered from 10 a.m.-4 p.m. Sept. 7 on JSC's closed-circuit television system.

"Developing High-Performance Technical Teams," lead by Hans J. Thamhain, a leading authority on technical teams from Bentley University in Massachusetts, will focus on organizing a new project team; implementing team-centered leadership; developing skills needed to build successful project teams; and

increasing awareness of certain drivers and barriers to team effectiveness.

JSC employees interested in the course, offered through the National Technological University, can watch it on any monitor tuned to JSC TV. The specific channel will be listed on channel 10 the morning of the seminar.

Reservations are now being taken to watch the course in Bldg. 45, Rm. 203 by Sheryl Gates at X33074 or Tim Johnson at X33071.

Reserves called to support Persian Gulf response

(Continued from Page 1)

Personnel Management Specialists in the Human Resources Office are dealing with each of the reservists individually, providing them information about how temporary military service will affect their jobs, promotions, leave and insurance coverage. Each affected individual will receive a fact sheet and a letter informing them of their options.

As for pay and leave, civil service reservists have several options. They will be paid by NASA if they take unused military leave (reservists receive 15 days per year and may carry over 15 days to the next year), annual leave or compensatory time. When those are exhausted, the employee will be placed on military furlough, under which they will be paid by their service but not by NASA. No

sick leave or annual leave are earned while an employee is on military furlough, but benefits such as health and life insurance are retained.

Greg Hayes, chief of the Human Resources Management Branch, asked all reservists who are called up to notify his office as soon as possible so that they may discuss the options with reservists before they leave for their duty stations.

When they return, employees who take military furlough generally have the right to be treated as if they had never been furloughed. They have the right to return to their previous job or to a comparable position.

Taking her situation in slightly nervous stride, Burnham left this message on her answering machine at home: "I'm off to fight for democracy and to keep oil prices down."

Hubble takes remarkably detailed image of galaxy core

(Continued from Page 1)

new view of the core of a galaxy which lies 40 million light-years away, more than half way to the great Virgo cluster of galaxies. These results promise that astronomers will be able to use the telescope to probe the mysterious centers of galaxies, in a search for massive black holes.

The image, taken with the Wide

Field/Planetary Camera on Aug. 17, reveals stars 30,000 times more tightly concentrated at the center of the galaxy than was previously expected. Since the galaxy, cataloged as NGC 7457, is assumed to be a "typical" galaxy, these preliminary findings suggest that the nuclei of normal galaxies may be more densely packed with stars than previously

thought.

HST scientists are greatly encouraged by this new observation and emphasize that it demonstrates intriguing science can be routinely accomplished with the space observatory.

"The images of NGC 7457 show emphatically that research on nuclei of galaxies can still be done," said Tod

Lauer, of the Wide Field/Planetary Camera imaging team. "We've never been able to study any galaxy outside of our Local Group, our 'neighborhood' of about two dozen galaxies, at this resolution before."

It is far from clear whether a massive black hole is at the center of NGC 7457, since the images alone do not provide the answer.

Furlough readiness actions continue

(Continued from Page 1)

day furlough during the first 15 days of fiscal 1991, which begins Oct. 1.

JSC Director Aaron Cohen is allowing each directorate to decide how and when, within the 15-day period, to implement the furlough if necessary. However, all employees will be required to take any furlough in one-day increments.

Directors are being urged to implement any furlough early in the period to avoid adverse effects on the STS-41 mission, set to launch Oct. 5.

The furlough is a possible response

to cuts required under the Gramm-Rudman-Hollings law, which begins to sequester funds throughout the government if Congress does not meet certain deficit reduction targets with the fiscal 1991 budget.

Truly stated that if an agreement is not reached by Oct. 1, a cut of about 31.9 percent would be required by NASA and other non-Defense agencies. The NASA management team is striving to minimize the impact of the reductions on the agency's "most valuable resource," its employees, he said.

Space News Roundup

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Chu to speak at UHCL

Dr. Paul Chu, the renowned Houston physicist who has made recent breakthroughs in superconductivity, will speak at the University of Houston-Clear Lake next Friday.

The noon, Sept. 7 presentation in UHCL's Atrium II is cosponsored by the JSC Asian Pacific Heritage Committee.

Chu will discuss "The Role of Creativity in the Search for a Room Temperature Superconductor."

Buses will be available at 11:30 a.m. from Bldg. 1. For details, call Kamlesh Lulla, x35159, or Freda Marks, x30606.